

Multiturn absolute rotary encoder IVM78E



- 4 Bit multiturn
- ATEX approval
- IECEx approval
- Flameproof enclosure
- Removable connection cap
- Analog output
- Surge and reverse polarity protection



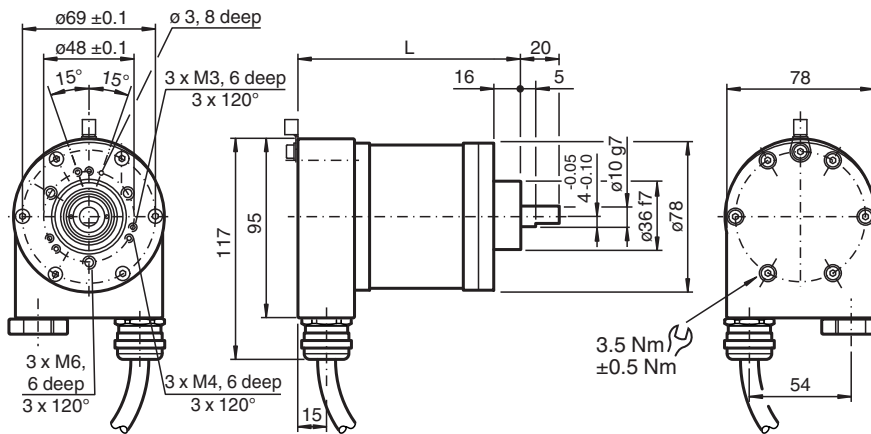
Function

This absolute rotary encoder with internal magnetic sampling provides an analog output. The output current value is corresponding to the shaft setting. The encoder can be easily programmed by means of electrical inputs and pushbuttons.

Dimensions

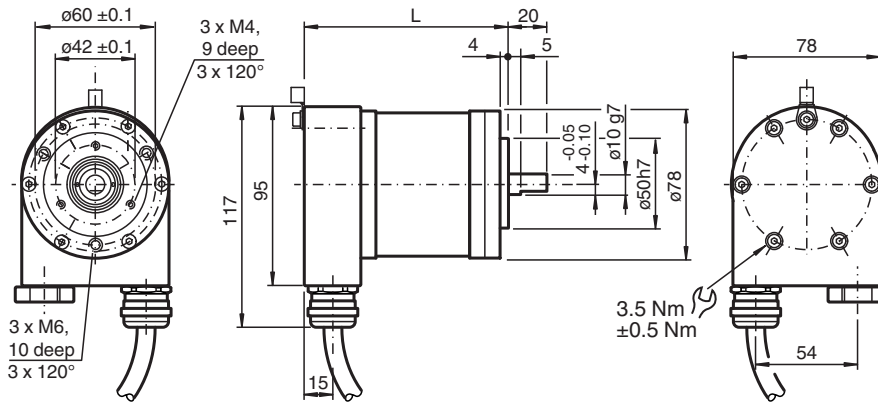
Encoder length L

Version		Length L
Radial cable exit	Clamping flange	134 mm
	Servo flange	134 mm
Axial cable exit	Clamping flange	150 mm
	Servo flange	150 mm

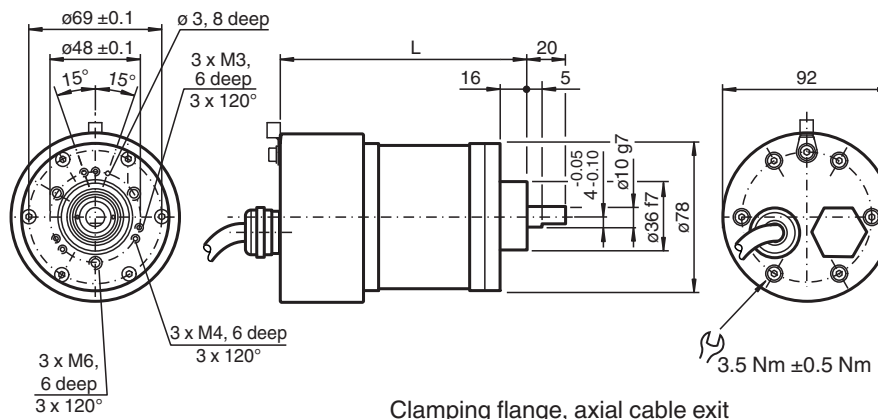


Clamping flange, cable exit radial

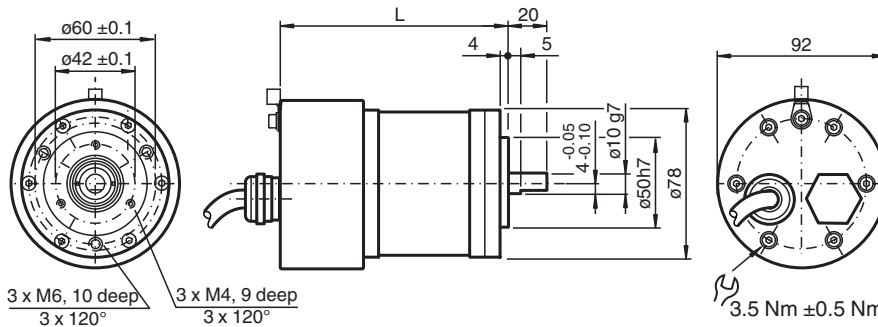
Dimensions



Servo flange, radial cable exit

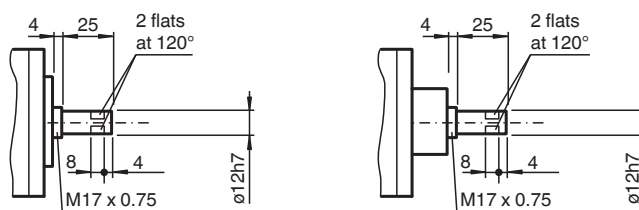


Clamping flange, axial cable exit



Servo flange, axial cable exit

Shaft 12 mm



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Technical Data

General specifications

Technical Data

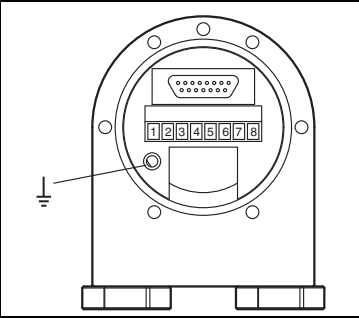
Detection type	magnetic sampling	
Device type	Multiturn absolute rotary encoder	
Measurement range	min. 0 ... 22.5 ° max. 16 x 360 °	
Resolution	16 Bit (12 bits/revolution)	
Functional safety related parameters		
MTTF _d	470 a	
L ₁₀	7.7 E+9 at 3000 rpm	
Electrical specifications		
Operating voltage	U _B	10 ... 30 V DC
Current consumption	typ. 40 mA	
Input 1		
Input type	lower limit of measurement range (Set 1)	
Signal voltage		
High	15 ... 30 V DC	
Signal duration	min. 1 s	
Input 2		
Input type	upper limit of measurement range (Set 2)	
Signal voltage		
High	15 ... 30 V DC	
Signal duration	min. 1 s	
Analog output		
Output type	1 analog output, current	
Default setting	rising ramp at ccw rotation	
Linearity error	≤ 0.15 %	
Load resistor	max. 500 Ω ; Max. value for operating voltage 15 V. For higher operating voltage higher load resistance can be used.	
Connection		
Terminal compartment	see ordering information	
Standard conformity		
Degree of protection	DIN EN 60529, IP66	
Climatic testing	DIN EN 60068-2-78 , no moisture condensation	
Emitted interference	EN 61000-6-4:2007/A1:2011	
Noise immunity	EN 61000-6-2:2005	
Shock resistance	DIN EN 60068-2-27, 100 g, 6 ms	
Vibration resistance	DIN EN 60068-2-6, 10 g, 10 ... 1000 Hz	
Approvals and certificates		
IECEx approval		
Equipment protection level Gb	IECEx ITS 15.0061X	
ATEX approval		
Equipment protection level Gb	ITS 15 ATEX 18372X	
Ambient conditions		
Operating temperature	-40 ... 70 °C (-40 ... 158 °F)	
Storage temperature	-40 ... 85 °C (-40 ... 185 °F)	
Mechanical specifications		
Material		
Combination 1	housing: anodized aluminum flange: anodized aluminum shaft: Stainless steel 1.4404 / AISI 316L	
Combination 2 (Inox)	housing: Stainless steel 1.4404 / AISI 316L flange: Stainless steel 1.4404 / AISI 316L shaft: Stainless steel 1.4404 / AISI 316L	
Housing	nickel-plated steel	
Flange	Aluminum	
Shaft	Stainless steel	

Technical Data

Mass	approx. 2600 g (combination 1) approx. 3900 g (combination 2)
Rotational speed	max. 3000 min ⁻¹
Moment of inertia	180 gcm ²
Starting torque	≤ 4 Ncm
Shaft load	
Axial	60 N
Radial	80 N
General information	
Use in the hazardous area	see instruction manuals

Connection

Signal	Terminal compartment
Ground wire	Grounding terminal
GND (rotary encoder)	1
+U _b (rotary encoder)	2
Not connected	3
SET 2	4
Not connected	5
Not connected	6
SET 1	7
Analog output	8



Additional Information

Description of rotary encoder functions

Default Settings

	Lower measuring range limit	Mid measuring range	Upper measuring range limit
Singleturn absolute rotary encoder	0	180°	360°
Multiturn absolute rotary encoder	0	8 x 360°	16 x 360°

Scaling the measuring range

Use signal inputs "Set 1" and "Set 2" to scale the measuring range (minimum measuring range: 22.5°).

1. Connect signal inputs "Set 1" and "Set 2" simultaneously to +U_B for 15 seconds. The programming mode is activated now.
2. Turn the rotary encoder shaft to position 1 (lower measuring range limit).
3. Connect signal input "Set 1" to a high-potential source (12 VDC ≤ high potential ≤ +U_B) for 1 second.
4. Connect signal input "Set 1" to ground
5. Turn the rotary encoder shaft to position 2 (upper measuring range limit).
6. Connect signal input "Set 2" to a high-potential source (12 VDC ≤ high potential ≤ +U_B) for 1 second.
7. Connect signal input "Set 2" to ground

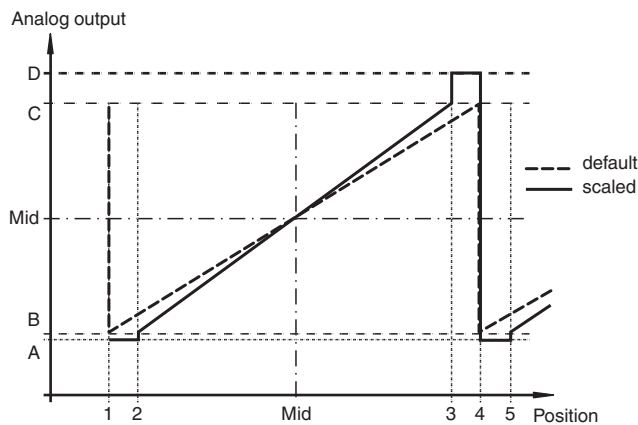
The analog output is now scaled to the programmed measuring range and the rotary encoder will operate in normal mode.

Resetting to the Default Setting

1. Connect the two signal inputs ("Set 1" and "Set 2") to a high-potential source (12 VDC ≤ high potential ≤ +U_B) for 1 second. The measuring range is then reset to the default setting.

Analog Output Properties

Depending on its design, the rotary encoder projects the current angular position of the rotary encoder shaft in an analog current or voltage value. The following graphic shows the values the output accepts at the various angular positions:



Legend:

Encoder type ¹⁾	Angular position					
	1	2	Mid	3	4	5

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Singleturn	Default settings	0°	-	180°	-	360°	-
	Scaled	0°	Lower measuring range limit	-	Upper measuring range limit	360°	Lower measuring range limit
Multiturn	Default settings	0°	-	2 ⁴ x 180°	-	2 ⁴ x 360°	-
	Scaled ²⁾	0°	Lower measuring range limit	-	Upper measuring range limit	2 ⁿ x 360°	Lower measuring range limit

n = whole number from 1 to 16

1) See model number

2) Overflow at 360°, 720°, 1440°, 2880°, 5760°, etc. depending on the scale set.

Encoder output type	Analog output value				
	A	B	Mid	C	D
0 V ... 5 V	-	0 V	2.5 V	5 V	-
0.5 V ... 4.5 V	0.25 V	0.5 V	2.5 V	4.5 V	4.75 V
0 V ... 10 V	-	0 V	5 V	10 V	-
0.5 V ... 9.5 V	0.25 V	0.5 V	5 V	9.5 V	9.75 V
4 mA ... 20 mA	3.6 mA	4 mA	12 mA	20 mA	22 mA
0 mA ... 20 mA	-	0 mA	10 mA	20 mA	-

Type Code

Ordering information

I	V	M	7	8	E	-	0			K	R	0			-	0	4	1	3
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Number of singleturn bits
13 8192

Number of multiturn bits
04 16

Housing material
N Aluminum
I INOX 1.4404 (AISI 316L)

Type of analog output
5 4 mA ... 20 mA
6 0 mA ... 20 mA

Option
0 Keine

Exit position
A Axial
R Radial

Connection type
KR Terminal compartment, 1 cable gland, 1 stopping plug

Flange version
1 Clamping flange
2 Servo flange

Shaft dimension
01 Shaft Ø10 mm x 20 mm
02 Shaft Ø12 mm x 25 mm

Option 1
E Explosion-proof, standard IP66

Functional principle
M Multiturn

Shaft version
V Solid shaft

Data format
I Analog current output

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Installation

Anti-interference measures

The use of highly sophisticated microelectronics requires a consistently implemented anti-interference and wiring concept. This becomes all the more important the more compact the constructions are and the higher the demands are on the performance of modern machines.

The following installation instructions and proposals apply for "normal industrial environments". There is no ideal solution for all interfering environments.

When the following measures are applied, the encoder should be in perfect working order:

- Termination of the serial line with a 120 Ω resistor (between Receive/Transmit and Receive/Transmit) at the beginning and end of the serial line (e. g. the control and the last encoder).
- The wiring of the encoder should be laid at a large distance to energy lines which could cause interferences.
- Cable cross-section of the screen at least 4 mm².
- Cable cross-section at least 0,14 mm².
- The wiring of the screen and 0 V should be arranged radially, if and when possible.
- Do not kink or jam the cables.
- Adhere to the minimum bending radius as given in the data sheet and avoid tensile as well as shearing load.

Operating instructions

Every encoder manufactured by Pepperl+Fuchs leaves the factory in a perfect condition. In order to ensure this quality as well as a faultless operation, the following specifications have to be taken into consideration:

- Avoid any impact on the housing and in particular on the encoder shaft as well as the axial and radial overload of the encoder shaft.
- The accuracy and service life of the encoder is guaranteed only, if a suitable coupling is used.
- The operating voltage for the encoder and the follow-up device (e. g. control) has to be switched on and off simultaneously.
- Any wiring work has to be carried out with the system in a dead condition.
- The maximum operating voltages must not be exceeded. The devices have to be operated at extra-low safety voltage.

Notes on connecting the electric screening

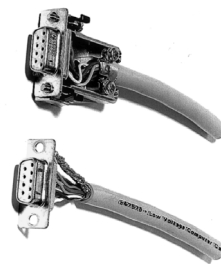
The immunity to interference of a plant depends on the correct screening. In this field installation faults occur frequently. Often the screen is applied to one side only, and is then soldered to the earthing terminal with a wire, which is a valid procedure in LF engineering. However, in case of EMC the rules of HF engineering apply.

One basic goal in HF engineering is to pass the HF energy to earth at an impedance as low as possible as otherwise energy would discharge into the cable. A low impedance is achieved by a large-surface connection to metal surfaces.

The following instructions have to be observed:

- Apply the screen on both sides to a "common earth" in a large surface, if there is no risk of equipotential currents.
- The screen has to be passed behind the insulation and has to be clamped on a large surface below the tension relief.
- In case of cable connections to screw-type terminals, the tension relief has to be connected to an earthed surface.
- If plugs are used, metallised plugs only should be fitted (such as sub D plugs with metallised housing). Please observe the direct connection of the tension relief to the housing.

Advantage:	metallised connector, shield
relief	clamped with the strain clamp
Disadvantage:	soldering shield on



Safety instructions

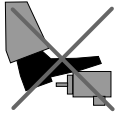
Please observe the national safety and accident prevention regulations as well as the subsequent safety instructions in these operating instructions when working on encoders.

If failures cannot be remedied, the device has to be shut down and has to be secured against accidental operation.

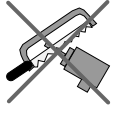
Repairs may be carried out only by the manufacturer. Entry into and modifications of the device are not permissible.

Tighten the clamping ring only, if a shaft has been fitted in the area of the clamping ring (hollow shaft encoders).

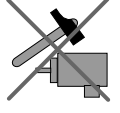
Tighten all screws and plug connectors prior to operating the encoder.



Do not stand on the encoder!



Do not remachine the drive shaft!



Avoid impact!



Do not remachine the housing!